

The family Aetheriidae consists of three genera: *Aetheria* Lam. from the Nile River with species in the Pleistocene of West Africa, a genus which resembles *Ostrea*, but with two adductors; *Acostea* D'Orb. of the Magdalena River, Colombia, also similar to *Ostrea* with one adductor; and *Bartlettia* Adams, from a tributary of the Amazonas, possessing two adductors, the anterior of which is the longer. The anterior area extends into the water, and the posterior area is hidden between the stones, resembling superficially *Anodontites tenebricosus*. In the opinion of Ihering, the fauna of the Paraguay River is related to that of the Amazonas, notably in the presence of Unionacea and fishes. The presence of *B. stefancensis* in Paraguay favors this thesis.

The shell is very irregular, subcircular, with the anterior area longer, twisted, and compressed, the posterior area broad, rounded, with the umbo-ventral zone straight, without hinge, the amphidetic ligament short, thick, and subinternal. The superior and inferior margins of the anterior zones are convergent, forming a little channel. The outer surface is irregular, resembling the bark of a tree, and is most irregular on the area of the shell exposed to erosion. External color greenish olive, inside greenish blue, and somewhat iridescent. The shell is free when young and adherent in the adult stage, the torsion being characteristic of the adult stage.

Measurements: a-p 10, u-v 5, thickness 2.5 mm. (youngest specimens, similar to *Anodontites tenebricosus*). A-p 81.4, u-v 38.5, thickness 32.2 mm. (adult stage), no. 19961, M.A.C.N.

This is the first record of *Bartlettia* in the drainage system of the Paraguay-Parana Rivers.

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## PINE WOODS AS ADEQUATE HABITAT TYPES FOR LAND MOLLUSCA

BY ALLAN F. ARCHER

Although comparatively little has been written on the subject of land mollusks in pine woods, what little we have in print testifies for the most part to the scarcity or absence of molluscan life in coniferous cover. It is gratifying to note the recent appearance of Henry van der Schalie's paper, "Larger Land Shells

from Pine Woods in Northern Michigan," *Mich. Acad. Sci., Arts, and Letters*, 1939, Vol. 25.

After some years of collecting in pine woods and the taking of field data in an area extending from New England to Texas I am convinced of the errors in the statement that such cover is quite barren of molluscan life. Even though poorly decomposed pine logs are apt to be barren of mollusks, the pine straw and other debris certainly harbor them. Charred pine wood furnishes adequate food and shelter for snails and slugs. It must, of course, be admitted that the lack of diversity of habitats, the poorer quality of available mineral salts, and the greater scarcity of plant foods render pines less favorable than hardwoods for a large variety of species of Mollusca and soil Arthropoda.

The field collector who tackles pine woods needs to bear in mind the past history of the locality that he investigates as well as the interplay between factors which operate on the animal life. He must view the locality with the critical eye of the ecologist. In the southern United States natural, pure stands of pine are rather uncommon, and many pine plots belong to an early stage of reforestation on formerly cultivated land. These latter can only be classified as old-field pine, which grows on eroded soil impoverished by years of soil-depleting cotton crops. Fire factors and overgrazing exert very depressing effects on pine cover that would otherwise harbor normal molluscan life. Collecting in pine woods is sometimes hard work, and should be undertaken whenever possible during wet seasons.

The nearest to complete barrenness that I have ever observed is to be found in pine timber on chert or indurated Coastal Plain soils (Jefferson and Autauga Counties, Alabama) where repeated fires have destroyed all humus, leaving neither food nor shelter for mollusks or soil arthropods. Even on poor, acidic soils in New England I have found pine straw inhabited by a fair amount of small Zonitidae and Endodontidae together with an occasional polygyrid. Pine woods in the southern states may be classified according to a genetic system: 1. Natural pine-forest types on calcareous soils. 2. Natural pine-forest types on non-calcareous soils. 3. Old-field pine. Item 1 is relatively scarce, in fact less than one per cent of the total area. Item 2 is widely

scattered, and occupies nearly every type of land form, but does not occupy a large total area. In mountainous country it is of negligible importance in comparison with the oak-pine type. Neither 1 nor 2 can be considered as representing the theoretical climax forest, but both are certainly influenced and maintained by edaphic factors. Item 3 has a very wide distribution, but never occupies any large single blocks of territory.

In the above connection Dr. van der Schalie quotes Dr. Fernald's view that jack pine is invariably associated with acid soils. While I am not prepared to contradict this, I believe that more evidence for or against this should be forthcoming from northern Michigan where some of the soils of the pine-woods region are not distinctly acid. In the southern United States most pines except those in swamps and savannas can and do grow on calcareous soils. From Virginia to Florida and Central America pines are known to grow not merely on calcareous soils but even on bare limestone. Pines of a number of species grow on dry soils regardless of their pH (within normal biological limits), especially if they do not suffer from competition with hardwood species.

Large land snails are quite as apt to be present in pine types on non-calcareous soil as on calcareous soil. In general, however, the rather small and the very small species predominate in pine communities. The following paragraphs will serve as illustrations of some typical pine-woods mollusk faunas of the lower South. All cited below will pertain to the "less favorable" non-calcareous soils.

A. *Piedmont Province*. Non-calcareous soils, although not necessarily deficient in mineral salts. 1. Old peneplain country now exhibiting juvenile land forms. Opelika, Lee County, Alabama. Pine woods of the old-field type, or else modified by fires. Cover: *Pinus echinata*, *P. taeda*, 3 species of young oaks, *Nyssa sylvatica*, *Rhus copallina*, *Smilax pumila*. Mollusca: *Retinella indentata paucilirata*, *Zonitoides intertextus*, *Triodopsis fallax vannostrandi*. 2. Hatchet Creek, Coosa County, Alabama. Pines on summits of sloping interflaves. The ground is rather rocky. Cover: *Pinus taeda*, *P. echinata*, *Hydrangea quercifolia*, *Smilax* sp., ferns. Mollusca: *Philomycus carolinianus*, *Haplotrema concavum*, *Gastrodonta interna*, *Zonitoides arboreus*, *Stenotrema*

*barbigerum*, *S. stenotrema*, *Triodopsis tridentata*, *Mesodon inflectus*, *M. perigraptus*.

B. *Coastal Plain Province*. The longleaf-pine woods occur on some of our poorest soils. Bon Secour, Baldwin County, Alabama. Cover: *Pinus palustris*, *Serenoa serrulata*, and a dense, high undergrowth of grasses. Mollusca: *Retinella indentata paucilirata*, *Polygyra auriformis*, *Praticolella mobiliana*.

C. *Appalachian Plateaus*. Uplands of low relief on sandstone. Black Warrior National Forest, Winston County, Alabama. The Pine cover is certainly of the old-field type. Cover: *Pinus cchinata*, *Sassafras variifolium*, 5 species of young oaks, *Morongia uncinata*, *Potentilla*, *Antennaria plantaginifolia*, and some grasses. Mollusca: *Philomycus carolinianus*, *Gastrodonta interna*, *Zonitoides intertextus*, *Z. arboreus*, *Stenotrema barbigerum*, *Triodopsis tridentata*, *Mesodon perigraptus*, *M. thyroidus*.

D. Pine straw samples from central Butler County, Alabama, yield the following small snails: *Zonitoides elliotti*, *Z. arboreus*, *Euconulus chersinus*, *Punctum minutissimum*, *Strobilops labyrinthica*.

In those localities in which more than three species are cited some fairly large snails occur even though the soils are non-calcareous. Even where the species found amount to only three, we are apt to find one of them to be common as to individuals. In the list of eight species from Winston County four of them are fairly common. I can state that the above localities are not exceptional, but are typical illustrations of the adequateness of pine woods as molluscan habitats.

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## ZOÖGENETES HARPA (SAY) IN THE ROCKY MOUNTAINS

BY PHIL L. MARSH

There has been some doubt about the inclusion of *Zoögenetes harpa* (Say) in the native molluscan fauna of the Rocky Mountains. Henderson did not mention it in his studies of "The Mollusca of Colorado, Utah, Montana, Idaho and Wyoming" (University of Colorado Studies, Vol. xiii, No. 2, Aug. 1924) but in his supplement (Vol. xxiii, No. 2, Jan. 1936), referring to his